SECTION D
SPECIFIC REGIONAL ANALYSIS REQUIREMENTS

CHAPTER 6
SERIOUS AND ABOVE OZONE AND CO NONATTAINMENT AREAS

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In addition to the regional analysis criteria and requirements applied to all areas at all times (as discussed in Chapter 5), and in order to demonstrate conformity, serious and above ozone and CO nonattainment areas are required to follow the following specific criteria, as stated in the conformity rule:

40 CFR §93.122, as amended by 62 FR 43814, August 15, 1997

(b) Regional emissions analysis in serious, severe, and extreme ozone nonattainment areas and serious CO nonattainment areas must meet the requirements of paragraphs (b)(1) through (3) of this section if their metropolitan planning area contains an urbanized area population over 200,000.

(1) By January 1, 1997, estimates of regional transportation-related emissions used to support conformity determinations must be made at a minimum using network-based travel models according to procedures and methods that are available and in practice and supported by current and available documentation. These procedures, methods, and practices are available from DOT and will be updated periodically. Agencies must discuss these modeling procedures and practices through the interagency consultation process, as required by §93.105(c)(1)(i). Network-based travel models must at a minimum satisfy the following requirements:

(i) Network-based travel models must be validated against observed counts (peak- and off-peak, if possible) for a base year that is not more than 10 years prior to the date of the conformity determination. Model forecasts must be analyzed for reasonableness and compared to historical trends and other factors, and the results must be documented;

(ii) Land use, population, employment, and other network-based travel model assumptions must be documented and based on the best available information;

(iii) Scenarios of land development and use must be consistent with the future transportation system alternatives for which emissions are being estimated. The distribution of employment and residences for different transportation options must be reasonable;

(iv) A capacity-sensitive assignment methodology must be used, and emissions estimates must be based on a methodology which differentiates between peak- and off-peak link volumes and speeds and uses speeds based on final assigned volumes;

(v) Zone-to-zone travel impedances used to distribute trips between origin and destination pairs must be in reasonable agreement with the travel times that are estimated from final assigned traffic volumes. Where use of transit currently is anticipated to be a significant factor in satisfying transportation demand, these times should also be used for modeling mode splits; and

(vi) Network-based travel models must be reasonably sensitive to changes in the time(s), cost(s), and other factors affecting travel choices.

(2) Reasonable methods in accordance with good practice must be used to estimate traffic speeds and delays in a manner that is sensitive to the estimated volume of travel on each roadway segment represented in the network-based travel model.

(3) Highway Performance Monitoring System (HPMS) estimates of vehicle miles traveled (VMT) shall be considered the primary measure of VMT within the portion of the nonattainment or maintenance area

and for the functional classes of roadways included in HPMS, for urban areas which are sampled on a separate urban area basis. For areas with network-based travel models, a factor (or factors) may be developed to reconcile and calibrate the network-based travel model estimates of VMT in the base year of its validation to the HPMS estimates for the same period. These factors may then be applied to model estimates of future VMT. In this factoring process, consideration will be given to differences between HPMS and network-based travel models, such as differences in the facility coverage of the HPMS and the modeled network description. Locally developed count-based programs and other departures from these procedures are permitted subject to the interagency consultation procedures of §93.105(c)(1)(i).

In this Chapter, we will focus our discussion on the network and other modeling requirements applicable specifically to serious and above ozone and CO nonattainment areas.

CONFORMITY DETERMINATION REQUIREMENTS FOR SERIOUS AND ABOVE CO NONATTAINMENT AREAS

The criteria and procedures for regional analyses for conformity determinations in serious and above ozone and CO nonattainment areas must meet the following requirements:

- Network-based travel model requirements,
- Traffic speed and delay estimates, and
- Highway Performance Monitoring System (HPMS) estimates of Vehicle Miles Traveled (VMT)

CRITERIA AND PROCEDURES FOR DETERMINING CONFORMITY FOR ACTIONS UNDER REVIEW

Perhaps the best summary for the conformity criteria applicable to transportation plans, TIPs and projects is Table 1 of the Conformity Rule:

40 CFR §93.109 (b), as amended by 62 FR 43807, August 15, 1997

TABLE 1 - CONFORMITY CRITERIA

ALL ACTIONS AT ALL TIMES

§93.110	*Latest planning assumptions*
§93.111	*Latest emissions model*
§93.112	*Consultation*

TRANSPORTATION PLAN

§93.113(b)	*TCMs*
§93.118 OR §93.119	*Emissions budget OR Emissions reduction*

TIP

§93.113(c)	*TCMs*
§93.118 OR §93.119	*Emissions budget OR Emissions reduction*

PROJECT (FROM A CONFORMING Plan/TIP)

§93.114	*Currently conforming plan/TIP*
§93.115	*Project from a conforming plan/TIP*
§93.116	*CO and PM_{10} hot spots*
§93.117	*PM_{10} control measures*

PROJECT (NOT FROM A CONFORMING Plan/TIP)

§93.113(d)	*TCMs*
§93.114	*Currently conforming plan/TIP*
§93.116	*CO and PM-10 hot spots*
§93.117	*PM-10 control measures*
§93.118 OR §93.119	*Emissions budget OR Emissions reduction*

Detailed description of conformity requirements are discussed in the rule and in other sections/chapters of this document:

1. General regional analysis requirements
   - Latest Planning Assumptions (§93.110) (Chapter 5)
   - Latest Emissions Model (§93.111) (Chapter 5)
   - Consultation (§93.112) (Chapter 2),
2. TCMs (§93.113) (Chapter 3),
3. Emissions Budget (§93.118) (Section D),
4. Emissions Reduction Tests including discussions on analysis years for meeting emissions reduction tests and "Baseline" and "Action" scenarios (§93.119) (Section D),
5. Conformity Credits for Control Measures in Regional Analysis (§93.122) (Chapter 5), and
6. CO Hot-spot Analysis (§93.116) (Chapter 10).

SPECIFIC CRITERIA AND PROCEDURES FOR DETERMINING CONFORMITY FOR SERIOUS AND ABOVE OZONE AND CO NONATTAINMENT AREAS

In addition to the criteria listed in Table 1 of the conformity rule, the conformity determination is also based on the criteria specific to the nonattainment areas, which are summarized in Exhibits 26 and 27 for ozone and CO, respectively.

Exhibit 26
Actions and Tests for Moderate and Above Ozone Nonattainment Areas
(40 CFR §93.109[c] as amended by 62 FR 43807, Aug. 15, 1997)

Nonattainment Area	Actions/Tests	Sec. (§)	Applicable Time Period
All nonattainment and maintenance areas	*Latest planning assumptions* *Latest emissions model* *Consultation* *TCMs in an approved SIP*	93.110 93.111 93.112 93.113	All times
Moderate and above, if an adequate or approved SIP budget exists	*Motor vehicle emissions budget test*	93.118	After EPA has declared a SIP motor vehicle emissions budget to be adequate for transportation conformity purposes
Moderate and above, if no adequate or approved budget exists	*Emissions reduction tests* (build/no-build test *AND* less-than 1990 test)	93.119	If EPA declares motor vehicle emissions reduction budget in submitted control strategy SIP inadequate for transportation conformity and no previously established motor vehicle emissions budgets exists.
Moderate and above with three years of clean data that have not submitted a maintenance plan and EPA has determined are not subject to reasonable further progress and attainment demonstration requirements	Must satisfy one of the following: 1. Emissions reduction tests; *OR* 2. Budget test, using the motor vehicle emissions budget in the submitted control strategy SIP; *OR* 3. Budget test using motor vehicle emissions in the most recent year of clean data as the motor vehicle emissions budget so long as EPA has established the budget through rule making that determines the area has clean data	93.119 93.118 93.118	Until maintenance plan is submitted

Exhibit 27
Actions & Tests for Carbon Monoxide Nonattainment & Maintenance Areas
(40 CFR §93.109[d], as amended by 62 FR 43807-08, Aug. 15, 1997)

Nonattainment/ Maintenance Area	Actions/Tests[1]	Sec. (§)	Applicable Time Period
All nonattainment and maintenance areas	*Latest planning assumptions* *Latest emissions model* *Consultation* *TCMs in approved SIPs* *Hot Spot test*	93.110 93.111 93.112 93.113 93.116	All times
Serious and moderate CO areas with design value greater than 12.7 ppm	*Motor vehicle emissions budget test* *OR*	93.118	After EPA finds the motor vehicle emissions budget in the submitted revised control strategy plan or maintenance plan adequate for transportation conformity purposes
Serious and moderate CO areas with design value greater than 12.7 ppm	*Emissions reduction tests* (build/no-build test *and* less-than 1990 test)	93.119	If EPA declares the motor vehicle emissions reduction budget in the revised submitted control strategy implementation plan or maintenance plan inadequate for transportation purposes and no previously established motor vehicle emissions budget exists in an approved SIP or previously submitted revised control strategy or maintenance plan
Moderate areas with design value of 12.7 ppm or below or not classified CO non-attainment area (not required to submit an attainment demonstration and have not submitted a main-tenance plan.)	Must satisfy one of the following: 1. *Emissions reduction tests* (either build/no-build test *or* no-greater-than 1990 test) *OR* 2. The State submits a revised implementation plan to EPA that contains motor vehicle emissions budgets and satisfies the *emissions budget test*	93.119 93.118	Until maintenance plan is submitted

[1] Regional analysis is required. Network models are required for serious and above ozone and CO areas with urbanized populations greater than 200,000. All other areas already using network models must continue to do so. For all others areas, best professional practice should be used.

Network Modeling Requirements

Network models are required for regional emissions analysis conducted in serious and above ozone and CO nonattainment areas with a urban population of 200,000 and more. All models were to have been in place by January 1, 1997. Furthermore, areas that are not serious or above ozone or CO nonattainment or maintenance areas with a population of less than 200,000 that have been using a network-based modeling analysis must continue to do so. In addition, whether or not an area is required to use a network model, all areas must use the consultation process to select regional models and assumptions, as required by 40 CFR§93.105(c), as amended by 62 FR 43805, Aug. 15, 1997.

The decision on setting the threshold for the network modeling requirements in urban areas with a population of 200,000 and more is based on several factors:

Paraphrased from 40 CFR, as amended by 62 FR 43790, August 15, 1997

> *...EPA believes that network modeling requirements are most important for large urbanized areas....*
>
> *...EPA believes that network modeling is not always appropriate in rural or urban areas with smaller populations, and therefore, should not be required in these areas...*
>
> *...§93.122(c) of the conformity rule requires areas that are already using network models to continue using them, even if they are not serious or above areas or have a population less than 200,000. EPA and DOT will consider the specific technical needs of smaller areas when developing future modeling guidance...*

The 1997 conformity rule has streamlined the modeling criteria from eleven (40 CFR §51.452(b)(1)(i)-(xi), 58 FR 62230-31, Nov. 24, 1993) to six (40 CFR §93.122(b)(1)(i)-(vi), Aug.15, 1997. EPA believes that the streamlined criteria and clarified rule language will assist areas in implementing the rule's network modeling provisions, and the retaining of these criteria establishes minimum acceptable practice.

EPA proposed and requested comment on three options for addressing the modeling criteria in the conformity rule proposed rule making process. Option 1 proposed to eliminate all of the 11 required attributes of network models in the original November 24, 1993, final transportation conformity rule and address the attributes only in guidance. Option 2 would have retained all of the original modeling attributes. Option 3 proposed to streamline the original requirements for network models and address the eliminated attributes in guidance. In the 1997 conformity rule, EPA finalized Option 3 with the six modeling criteria. EPA and DOT, as stated in the preamble to the 1997 conformity rule (40 CFR, 62 FR 43791, as amended Aug. 15, 1997), are also committed to develop modeling guidance in the future to address some of the modeling requirements that are eliminated from the rule and to foster the exchange of information on current and future modeling improvements, through an open stakeholder process. The modeling guidance will be updated periodically as modeling practices become more sophisticated.

Six Network-based Travel Modeling Requirements

The six modeling criteria and their specific requirements are summarized below. (Refer to 40 CFR §93.122(b)(1)(i)-(vi), as amended by 62 FR 43793, Aug. 15, 1997 for complete discussion.)

1. Validation against observed counts for base year not more than 10 years prior to conformity determination.

EPA requires that models should be validated against counts for all modes, including transit, bicycle, and pedestrians against "observed" counts. EPA has also qualified the proposed requirement for validation against peak- and off-peak counts so that validation against both peak- and off-peak counts is only required where it is possible. EPA is aware that not all areas collect peak- and off-peak counts. As a result, although EPA continues to believe that validation against peak- and off-peak counts is preferable, the rule only requires it where it is already possible given available data. EPA intends to address other validation issues such as time limit for validation, validation against peak- and off-peak travel demand, traffic volume, speed, and mode share data for household and commercial travel, etc., in the EPA/DOT modeling guidance which will have further discussion about best practices and other advances in validation techniques.

EPA requires that model forecasts be analyzed for reasonableness and compared to historical trends and other factors, and that the results be documented. Historical trends in travel behavior may include factors such as changes in per capita vehicle trips and VMT, trip length, mode shares, and time-of-day travel. Details will be addressed in the forthcoming modeling guidance.

2. Documented current assumptions of land use, population, employment and other network-based modeling assumptions.

EPA requires land use, population, employment, and other network-based model assumptions to be documented and based on the best available information. Details on “other network-based model assumptions” will be addressed in the EPA/DOT modeling guidance.

3. Consistent land development scenarios and future transportation alternatives for which emissions are being estimated.

The distribution of employment and residences for different transportation options must be reasonable. Appropriate consideration must be given to how major anticipated transportation system improvements might influence development and, in turn, how that might affect the forecasted distribution of population and employment used to estimate travel and emissions.

4. A capacity-sensitive assignment method must be used, and emissions estimates must be based on a methodology which differentiates between peak- and off-peak volumes and speeds and uses speeds based on final assigned volumes.

EPA intends that emissions be calculated on the basis of peak- and off-peak speeds separately and applied to peak- and off-peak final assigned volumes, regardless of whether these assigned volumes are based on peak- and off-peak modeling or are modeled on a 24-hour basis.

5. Reasonable agreement between zone-to-zone travel times used in trip distribution and the travel times resulting from traffic assignment (i.e. feedback).

This network modeling requirement is based on 40 CFR §51.452(b)(1)(iv), 58 FR 62230, Nov. 24, 1993 and 40 CFR §93.130(b)(1)(iv), 58 FR 62249, Nov. 24, 1993, of the November 1993 conformity rule, which requires feedback of travel times resulting from traffic assignment to travel times used in trip distribution. Reasons for EPA to retain this requirement include: there is clear theoretical justification for feedback between traffic assignment and trip distribution, especially in congested areas, and full feedback is already widely available and used.

The rule requires that zone-to-zone travel impedances (which may include a combination of vehicle travel time, cost, travel times by other modes, etc.) used in trip distribution be in reasonable agreement with travel times that are estimated from final assigned traffic volumes to reflect the fact that speeds should be estimated by post-processing assigned volumes.

6. Sensitivity to time, cost, and other factors affecting travel choice.

Network-based models must be reasonably sensitive to changes in the time(s), cost(s), and other factors affecting travel choices. The November 1993 conformity rule strongly encouraged a dependence of trip generation on the accessibility of destinations, but it was not specifically required. EPA continues to believe that such a trip generation requirement is not a widely available, minimum practice.

Deadline for Use of Network Models and Affected Area[2]

The 1997 conformity rule extended the deadline for implementing the network modeling requirements from January 1, 1995 to January 1, 1997. EPA acknowledged that the January 1, 1997 deadline has already passed, since the conformity rule was finalized on August 15, 1997. The original conformity rule required that areas use network models in conformity analysis by January 1, 1995, and when the proposal was being developed, most areas had achieved the rule's network modeling requirements by this deadline. EPA believed that an extension until January 1, 1997 would be adequate to address the difficulties for the few areas that had not yet complied with the deadline. At present, all affected areas are using network models.

Traffic Flow and Delay Estimates

"Reasonable methods in accordance with good practice" must be used to estimate traffic speeds and delays in a manner that is sensitive to the estimated volume of travel on each roadway segment

[2] 40 CFR, as amended by 62 FR 43790-43791, Aug. 15, 1997.

represented in the network-based travel model (40 CFR §93.122(b)(2), as amended by 62 FR 43814, Aug. 15, 1997).

Issue of Free-flow Speed and Speed Post-Processing[3]

EPA believes that free-flow speeds on network links should be based on empirical observations, a requirement in the November 1993 conformity rule 40 CFR §51.452(b)(1)(iv), 58 FR 62230, Nov. 24, 1993 and 40 CFR §93.130(b)(1)(iv), 58 FR 62249, Nov. 24, 1993, and other network speed related issues are best handled in modeling guidance, where they can be fully discussed and can avoid misinterpretation.[4]

EPA and DOT emphasize that input network speed assumptions used in model application must be consistent with speed assumptions used in model development and calibration, and that these assumptions and calibration techniques should be documented.

EPA and DOT recognize that free-flow impedance inputs into traffic assignment may not reflect empirically observed free-flow speeds, because these input impedances may reflect considerations that affect travel behavior other than travel time, such as driver preferences for using specific classes of facilities. If free-flow impedance inputs used in traffic assignment deviate significantly from observed free-flow speeds, the documentation should include a discussion of the differences and rationale for adjustments made.

Since emissions estimates are extremely sensitive to vehicle speed, EPA and DOT recommend that speeds be estimated in a separate step after traffic assignment (also known as "post-processing"), using refined speed-volume relationships and final assigned traffic volumes. Post-processed speeds estimated in the validation year should be compared with speeds empirically observed during the peak- and off-peak periods. These comparisons may be made for typical facilities, for example, by facility class/area type category. Based on these comparisons, speed-volume relationships used for speed post-processing should be adjusted to obtain reasonable agreement with observed speeds. *Regardless of the specific analytical technique, every effort must be made to ensure that speed estimates are credible and based on a reproducible and logical analytical procedure.*

Highway Performance Monitoring System (HPMS) Estimates of VMT

The Highway Performance Monitoring System (HPMS) is a national transportation data base. It includes limited data on all public roads, more detailed data for a sample of the arterial and collector functional systems, and certain summary information for urbanized, small urban and rural areas. The HPMS provides data that reflects the extent, condition, performance, use, and operating characteristics of the Nation's highways. Please see the FHWA HPMS website for more information: http://www.fhwa.dot.gov/ohim/hmpspagel.htm.

[3] 40 CFR, as amended by 62 FR 43794, Aug. 15, 1997.

[4] The November 1993 requirement was read by some to require significant data collection efforts. In fact, EPA had simply intended that available empirical information be used instead of posted speed limits.

As described in the conformity rule[5], for areas which are sampled on a separate urban area basis, HPMS estimates of vehicle miles traveled (VMT) shall be considered the primary measure of VMT within the portion of the nonattainment or maintenance area and for the functional classes of roadways included in HPMS. For areas with network-based travel models, a factor (or factors) may be developed to reconcile and calibrate the network-based travel model estimates of VMT in the base year of its validation to the HPMS estimates for the same period. These factors may then be applied to model estimates of future VMT. In this factoring process, consideration shall be given to differences between HPMS and network-based travel models, such as differences in the facility coverage of the HPMS and the modeled network description. Locally developed count-based programs and other departures from these procedures are permitted subject to the Interagency Consultation Procedures of 40 CFR §93.105(c)(1)(i), as amended by 62 FR 43805, Aug. 15, 1997, and also discussed in Chapter 2.

Communities that are not designated serious or above ozone or CO nonattainment areas may also use the HPMS procedure described above or other locally developed programs and procedures (e.g. count-based programs), subject to the interagency consultation process. A detailed discussion of the procedures to be followed in the application of the factoring recommendations is presented later in this Chapter.

INTEGRATION OF NETWORK MODEL AND EMISSIONS MODEL FOR REGIONAL ANALYSIS

Development of regional emissions estimates for plan or TIP conformity determinations require the integration of travel demand estimates and the emissions factors output by the most current emissions factor model (e.g., MOBILE5a and EMFAC7g in California). Exhibit 28 graphically displays an example of the integration process that is required to develop regional emissions estimates.

Exhibit 29 shows that estimates of VMT that are output by the regional travel demand model for the base year must be compared to VMT data for the same year obtained from HPMS. The base year estimates of VMT output by the model must be adjusted to match the HPMS VMT estimates on a roadway class-specific basis, resulting in HPMS-adjusted VMT estimates for each roadway class. EPA has developed guidance that provides additional details on the technical issues involved in this adjustment process.[6]

Estimates of congested speed for each roadway class, and output by the regional travel demand model, are input to the MOBILE emissions model to develop roadway class-specific emissions factors for the base year. These emissions factors are combined with the HPMS-adjusted VMT estimates to compute on-road emissions for each roadway class. The resulting emissions estimates are then summed to compute total regional emissions from on-road motor vehicles.

[5] 40 CFR §93.122(b)(3), as amended by 62 FR 43814, Aug. 15, 1997.

[6] U.S. EPA, §187 VMT Forecasting and Tracking Guidance, Jan. 1993.

Exhibit 28
Integration of the Travel & Emissions Modeling Processes for Regional Analysis

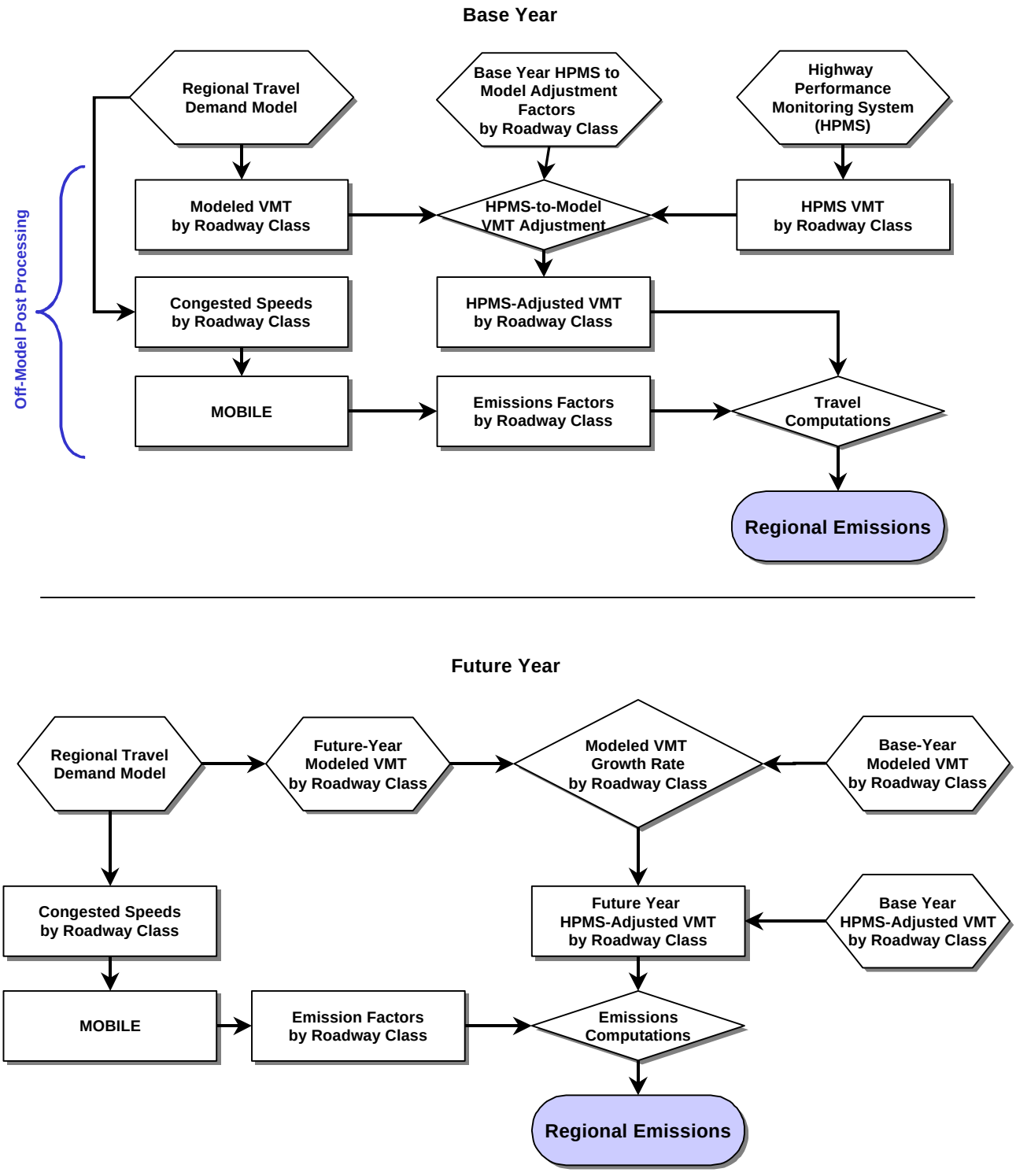
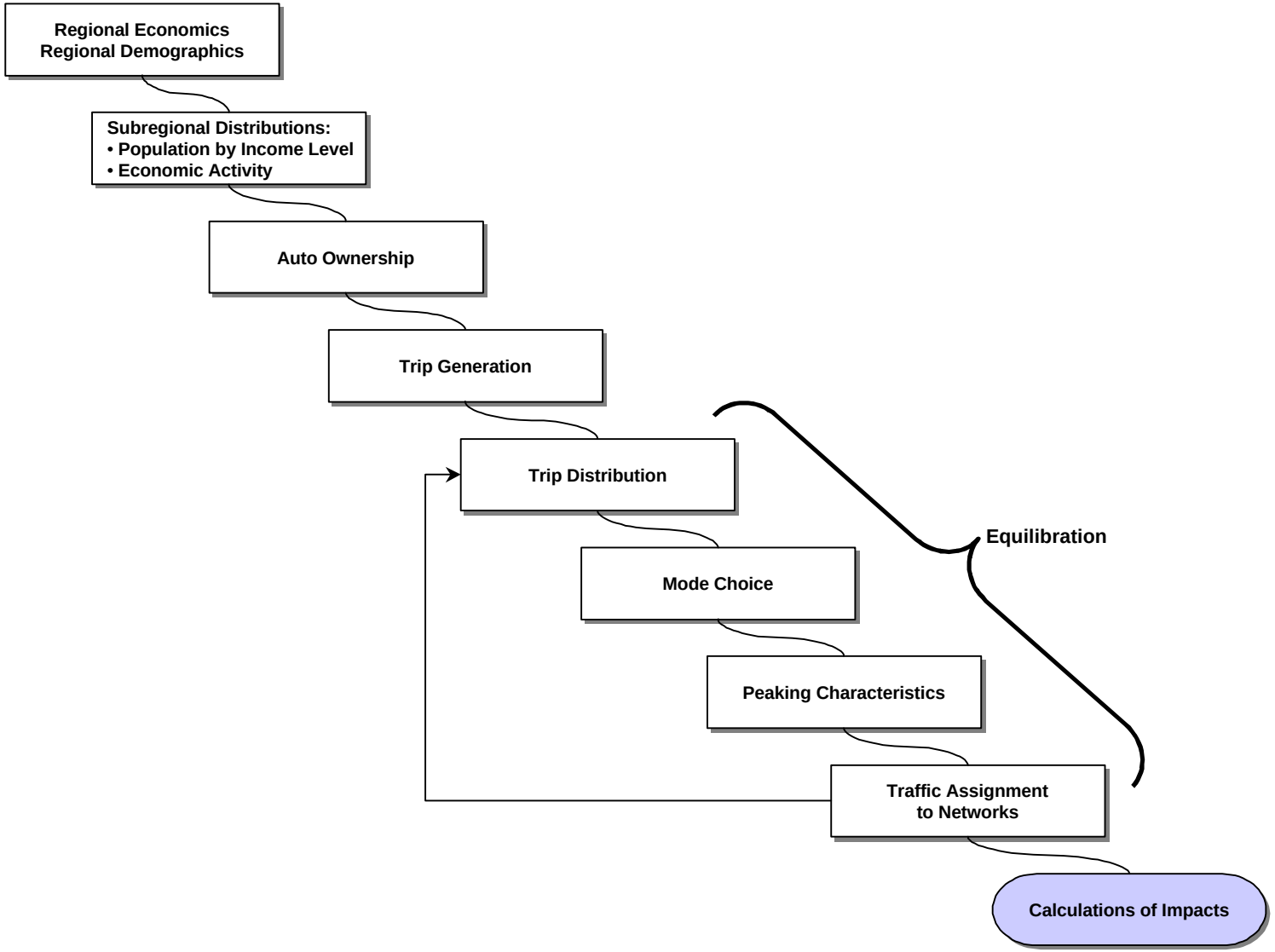


Exhibit 29
Conventional Regional Travel Models



For each future year of interest (i.e., analysis year), the regional travel model must first be used to develop roadway-class specific VMT estimates. These estimates are then compared to the base year VMT estimates output by the travel model, to develop roadway-class specific growth rates. The base year HPMS-adjusted VMT estimates described above are then multiplied by these growth rates to compute future year HPMS-adjusted VMT estimates. Similar to the base year computation methodology, congested speeds output by the model are input to MOBILE to develop roadway class-specific emissions factors. The HPMS-adjusted VMT estimates for each roadway class are then multiplied by the emissions factors output by MOBILE, and the resulting emissions estimates summed across all roadway classes to compute total regional on-road emissions. This process is followed for each selected analysis year.

The above example provides one approach to computing HPMS-adjusted VMT estimates for each analysis year and scenario. There are, however, a number of other variations that could be pursued depending on the robustness of the available data and desired level of analysis. For example, additional temporal resolution could be introduced into the analysis by performing separate peak- and off-peak period computations (or even hourly computations if such data are available). Finer spatial resolution could also be pursued by performing the calculations on a link-specific basis, or by traffic analysis zone (TAZ) or other geographic limits.

It is also possible to limit the resources required for adjusting regional travel demand modeling results to available HPMS counts, by developing a single areawide adjustment factor rather than disaggregating the analysis by roadway class. However, this approach may lead to a loss in accuracy likely to result from developing and using a single growth rate to represent the change in travel across all roadways in an urban area.

CHECKING THE REASONABLENESS OF TRAVEL MODEL FORECASTS

FHWA issued a memorandum on December 21, 1995[7] to provide guidance on issues regarding model validation and reasonable expectations of current travel model capabilities. The FHWA guidance discussed that two difference processes are used to verify that: 1) the model is doing what it is expected to do (calibration), and, 2) what the model is doing is correct (validation). Calibration and validation tests typically employ comparisons between modeled and measured estimates of vehicle volumes on specific links, ignoring other model estimates such as VMT, vehicle-hours traveled (VHT), congested speeds, travel times, and delay. However; in the development of emissions inventories, key travel parameters are trips, VMT, and speed.

To provide a reasonableness check on the network model forecasts, modelers typically define a set of screenlines. Model-estimated traffic volumes are then checked against actual counts of the traffic crossing the lines. It is desirable to establish at least two screenlines which extend to the limits of the region (one approximately east-west and the other approximately north-south). Additional screenlines are often located along natural or constructed barriers (e.g. lakes, rivers, mountain ranges, freeways, canals) within the region. Generally, the more screenlines the better, with the exact number most often

[7] FHWA Memorandum, *Travel Modeling Guidance for Air Quality Analysis*, Dec. 21, 1995. See Appendix H.

depending on the resources that the planning agencies have available for such traffic count activities.

Additional insights on this issue, as well as more sophisticated methods for evaluating the validity of regional travel models is contained in the NARC Modeling Manual[8] (Section 3.6, Model Development and Validation, pp. 3-86).

Opportunities and Limitations in Travel Demand Modeling

The conventional four-step travel demand forecasting model, as shown in Exhibit 29, has several limitations, including:

- Mode split and traffic assignment are often treated in a recursive framework with feedback and approximate equilibration, but the feedback loops only extend to trip distribution,
- Similar feedback loops often do not extend to trip generation, auto ownership, or the pattern of activity location in the region, and effects of facilities on land development and use are not well represented,
- Time of travel and peaking are treated in highly approximate ways,
- Route choice and accessibility are often defined in terms of travel time rather than a broader measure encompassing cost or other indicators of quality of service,
- A vehicle trip involving multiple stops (e.g. at a gas station) is typically treated as a series of non-related trips, rather than as a single linked trip,
- Analysis typically focuses on vehicular trips while ignoring or downplaying trips made on foot or by bicycle, and focuses on home-based trips while treating non-home based travel in highly approximate ways, and
- Little is known about the number, length, or location of intra-zonal trips.

While these limitations are valid, it is important to remember the origin and purpose of existing travel demand models. By and large, they were originally developed to help determine the size of needed highways (i.e. given projected travel patterns, how much additional capacity would be needed and where). In contrast, these models are now being used to assess the impacts of alternative policies designed to reduce trips, alter trip lengths, increase vehicle occupancy and a variety of other transportation demand management strategies. These new uses call for accurate link-level speeds and volumes to address demands for increasingly accurate emissions impact estimates.

Opportunities and Limitations in Emissions Modeling

[8] Harvey, G and E. Deakin, *A Manual of Regional Transportation Modeling Practice for Air Quality Analysis*, prepared for NARC, July 1993.

MOBILE is designed to generate emissions estimates based on a series of default assumptions (based on national estimates) that have been coded into the model. Its accuracy can, however, be significantly improved by input of area-specific assumptions when adequate data is available. An example of the process that can be used to develop such area-specific inputs is presented in Exhibit 30.

The quality of emissions modeling results is only as good as the underlying data. In cases where only limited local data are available, additional data collection may be needed to improve the accuracy of the modeling results. Before embarking on a program to improve the accuracy of model inputs, analysts should perform a limited sensitivity analysis on the model. The purpose of the analysis would be to determine where to best invest limited modeling resources.

Exhibit 30 shows that the underlying area-specific data (vehicle registration data and annual mileage accumulation rates) can be used to compute a local VMT mix. While the data described above are available in most urban areas, this analysis requires a certain level of resources to complete. Additional resources would be needed to perform similar analysis to develop other area-specific assumptions that can be input to the emissions model.

It thus comes down to a question of what level of resources are available and should be used to make modeling improvements. The opportunity exists to improve modeling results, but doing so may require significant resources. As a general rule, conformity-related emissions analysis should rely on assumptions as good as those used in SIP-related emissions analysis.

Exhibit 30
Comparison of MOBILE Default & Area-Specific VMT Mixes

Default VMT Mix
The default VMT mix represents a typical urban mix, based on national data characterizing registration distribution, annual mileage accumulation rates by age for each vehicle type, etc. This default mix is used to compute a composite emissions factor in MOBILE5 from the eight vehicle class-specific (e.g. light-duty vehicles) emissions factors computed by the model.
Area-Specific VMT Mix
To compute an area-specific VMT Mix, vehicle registration data can be used to compute the fraction of the in-use fleet for each vehicle class contained in the model. Annual mileage accumulation rates can also be obtained in those areas where vehicle mileage is tracked (e.g., in an I/M Program area where vehicle mileage is recorded at the time of annual or biennial testing). Average mileage accumulation rates for each vehicle class can be computed from these data and combined with the vehicle class-specific fleet fractions obtained from the registration data to compute class-specific VMT fractions (i.e. VMT mix). The resulting VMT mix is then input to MOBILE.

CRITERIA AND PROCEDURES FOR DETERMINING CONFORMITY FOR NO_2 NONATTAINMENT AREAS

The conformity determination in a NO_2 nonattainment area is also based on the criteria specific to the nonattainment area, which are summarized in Exhibit 31. In short, NO_2 nonattainment areas have the option to use either the build/no-build test or no-greater-than 1990 test to determine conformity, provided they have not submitted a control strategy SIP or maintenance plan.[9]

Exhibit 31
Actions & Tests for NO_2 Nonattainment & Maintenance Areas
(40 CFR §93.109[f], as amended by 62 FR 43808, Aug. 15, 1997)

Nonattainment/ Maintenance Area	Actions/Tests	Sec. (§)	When
All NO_2 nonattainment and maintenance areas	*Latest planning assumptions* *Latest emissions model* *Consultation* *TCMs (for transportation plan/ TIP)*	93.110 93.111 93.112 93.113 (b) - (c)	All times
NO_2 nonattainment and maintenance areas	*Motor vehicle emissions budget test*	93.118	After EPA finds the motor vehicle emissions budget in the submitted revised control strategy SIP or maintenance plan adequate for transportation conformity purposes
	Emissions reduction tests (build/no-build test *OR* no- greater- than1990 test)	93.119	If no adequate budget exists.

For other requirements, see the following sections of this Guide:

- General regional analysis requirements
  - Latest Planning Assumptions (§93.110) and Chapter 5
  - Latest Emissions Model (§93.111) and Chapter 5
  - Consultation (§93.112) and Chapter 2,
- TCMs (§93.113) and Chapter 3,
- Emissions Budget (§93.118) and Section D,
- Emissions Reduction Tests including discussions on analysis years for meeting emissions reduction tests and "Baseline" and "Action" scenarios (§93.119) and Section D, and
- Conformity Credits for Control Measures in Regional Analysis (§93.122) and Chapter 5.

[9] 40 CFR §93.119(c), as amended by 62 FR 43812, Aug. 15, 1997.

QUESTIONS AND ANSWERS

How do modeling improvements relate to conformity requirements?

Paraphrased from 40 CFR, as amended by 62 FR 47392, August 15, 1997

> *...EPA recognizes the concerns about the implementation difficulties that may occur as a result of model improvements which may lead to problems associated with inconsistencies between the models used in conformity analysis and those used in SIP development. However, Clean Air Act §176(c)(1)(B)(iii) requires conformity determinations to "be based on the most recent estimates of emissions." EPA believes that areas must use the most current tools available at the time of the conformity determination, in accordance with the Clean Air Act. Using the best models and assumptions will also produce the best emissions estimates on which areas will base decisions regarding transportation and air quality. EPA also notes that areas already have the ability to use the consultation process to coordinate the introduction of transportation modeling improvements into their planning...*

Regional travel forecasts are available for pm peak- and off-peak periods. At what level of temporal detail (e.g. hourly, daily, etc.) should regional emissions be calculated?

The transportation conformity rule (40 CFR §93.122[b][1][iv], as amended by 62 FR 43814, Aug. 15, 1997) requires that all urbanized areas of greater than 200,000 population must use a capacity-sensitive assignment methodology that differentiates between peak- off-peak link volumes and speeds, and uses speeds based on final assigned volumes. Thus, regional emissions must be computed on the basis of both peak- off-peak periods.